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EXPERT GROUP ON OUTCOME-ORIENTED
TARGETS FOR THE PROGRAMMES OF WORK
ON THE BIODIVERSITY OF INLAND WATER
ECOSYSTEMS AND MARINE AND COASTAL
ECOSYSTEMS

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INTEGRATION OF OUTCOME-ORIENTED TARGETS INTO THE PROGRAMMES OF WORK OF THE CONVENTION, TAKING INTO ACCOUNT THE 2010 BIODIVERSITY TARGET, THE GLOBAL STRATEGY FOR PLANT CONSERVATION, AND RELEVANT TARGETS SET BY THE WORLD SUMMIT ON SUSTAINABLE DEVELOPMENT

Outcome-oriented targets for the implementation of the elaborated programme of work on marine and coastal biological diversity

Note by the Executive Secretary

I. INTRODUCTION

1. This note presents, for the consideration of the Expert Meeting on Outcome-Oriented Targets for the Programmes of Work on the Biodiversity of Inland Water Ecosystems and Marine and Coastal Ecosystems, a draft proposal for outcome-oriented targets for the implementation of the elaborated programme of work on marine and coastal biological diversity. The targets, which were originally developed in response to paragraph 2 (i) of recommendation VIII/3 A of the Subsidiary Body on Scientific, Technical and Technological Advice (SBSTTA), have been further refined according to decision VII/30, paragraph 12 (c), as well as decision VII/5 annex I, section C.

2. In decision VII/30, paragraph 12 (c), the Conference of the Parties requested the Executive Secretary to refine proposals for the integration of outcome-oriented targets into the programmes of work on inland water biodiversity and of marine and coastal biodiversity, according to the framework in annex II and using the approach set out in annex III to the same decision, identifying more precise targets, including, as appropriate, quantitative elements. The Conference of the Parties also decided that outcome-oriented targets are a key priority for SBSTTA.

3. The text in decision VII/5 reflects that in decision VII/30. Specifically, in decision VII/5, annex I, section C, the Conference of the Parties requested SBSTTA at its tenth or eleventh meeting to further refine the proposal for the integration of outcome-oriented targets into the programme of work on marine and coastal biodiversity, taking into account, as appropriate, the framework in annex II to decision VII/30 on the future evaluation of progress on the Strategic Plan, and taking into account that these goals and targets should be viewed as a flexible framework within which national and/or regional targets may be developed, according to national priorities and capacities.

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4. The present document has been developed in response to the requests in decisions VII/30 and VII/5, and has undergone two rounds of peer review. The targets in this document are a refinement of those presented to the Conference of the Parties in the note by the Executive Secretary on outcome-oriented targets for the implementation of the elaborated programme of work on marine and coastal biological diversity (UNEP/CBD/COP/7/20/Add.5), and which the Conference of the Parties did not have time to consider. Document UNEP/CBD/COP/7/20/Add.5 took into account the comments made by Parties at the ninth meeting of SBSTTA and immediately thereafter, based on its consideration of the proposal in document UNEP/CBD/SBSTTA/9/14/Add.3.

5. Section II of this document discusses the relationship between the programme of work on marine and coastal biological diversity and other relevant processes. The proposed list of goals and targets are contained in the annex I to this document.

II. RELATIONSHIP BETWEEN THE PROGRAMME OF WORK ON MARINE AND COASTAL BIOLOGICAL DIVERSITY AND OTHER RELEVANT PROCESSES.

A. Millennium Development Goals

6. The implementation of the programme of work on marine and coastal biological diversity makes a direct contribution to the achievement of the Millennium Development Goals (MDGs), specifically its target 9, namely, to integrate principles of sustainable development into country policies and programmes and to reverse the loss of environmental resources. Through its promotion of sustainable fisheries and aquaculture, the programme of work also contributes to target 2, which is to halve, between 1990 and 2015, the proportion of people who suffer from hunger.

B. Plan of Implementation of the World Summit on Sustainable Development

7. The following targets of the Plan of Implementation of the World Summit on Sustainable Development (WSSD) are completely consistent with the programme of work on marine and coastal biological diversity, and will be integrated (either directly or in a modified format as appropriate) into the programme of work:

(a) *Paragraph 29 (d)*: Encourage the application by 2010 of the ecosystem approach, noting the Reykjavik Declaration on Responsible Fisheries in the Marine Ecosystem ^{1/} and decision V/6 of the Conference of the Parties;

(b) *Paragraph 31 (a)*: Maintain or restore (fisheries) stocks to levels that can produce the maximum sustainable yield with the aim of achieving these goals for depleted stocks on an urgent basis and where possible not later than 2015;

(c) *Paragraph 32 (c)*: Develop and facilitate the use of diverse approaches and tools, including the ecosystem approach, the elimination of destructive fishing practices, the establishment of marine protected areas consistent with international law and based on scientific information, including representative networks by 2012 and time/area closures for the protection of nursery grounds and periods, proper coastal land use; and watershed planning and the integration of marine and coastal areas management into key sectors; ^{2/}

(d) *Paragraph 33 (d)*: Make every effort to achieve substantial progress by the next Global Programme of Action conference in 2006 to protect the marine environment from land-based activities;

^{1/} See Food and Agriculture Organization of the United Nations document C200/INF/25, appendix I.

^{2/} This wording is also consistent with SBSTTA recommendation VIII/3 A.

(e) *Paragraph 36 (b)*: Establish by 2004 a regular process under the United Nations for global reporting and assessment of the state of the marine environment, including socio-economic aspects, both current and foreseeable, building on existing regional assessments;

(f) *Paragraph 44*: The achievement by 2010 of a significant reduction in the current rate of loss of biological diversity.

8. In addition, the programme of work on marine and coastal biological diversity makes a direct contribution to the implementation of the following paragraphs of the Plan of Implementation of the World Summit:

(a) *Paragraph 31 (d)*: Urgently develop and implement national and, where appropriate, regional plans of action, to put into effect the international plans of action of the Food and Agriculture Organization of the United Nations (FAO), in particular the International Plan of Action for the Management of Fishing Capacity ^{3/} by 2005 and the International Plan of Action to Prevent, Deter and Eliminate Illegal, Unreported and Unregulated Fishing ^{4/} by 2004. Establish effective monitoring, reporting and enforcement, and control of fishing vessels, including by flag States, to further the International Plan of Action to Prevent, Deter and Eliminate Illegal, Unreported and Unregulated Fishing;

(b) *Paragraph 58 (g)*: Develop community-based initiatives on sustainable tourism by 2004 and build capacities necessary to diversify tourism products, while protecting culture and traditions and effectively conserving and managing natural resources.

C. *Biodiversity-related conventions, United Nations organizations and other relevant regional and international organizations and processes*

9. The programme of work on marine and coastal biological diversity is consistent with the relevant provisions of the United Nations Convention on the Law of the Sea, the marine and coastal components of the Ramsar Convention on Wetlands, the regional seas programmes and action plans, the International Coral Reef Initiative, the Code of Conduct on Responsible Fisheries of the Food and Agriculture Organization of the United Nations, the Reykjavik Declaration on Responsible Fisheries in the Marine Environment, and activities of the Intergovernmental Oceanographic Commission (IOC) of UNESCO.

10. In addition, elements are relevant to provisions of other conventions, including, *inter alia*, the Convention on Migratory Species, the Convention under the International Maritime Organization (Marpol), the World Heritage Convention and the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES).

11. The programme of work on marine and coastal biological diversity also takes note of current regional initiatives, such as those undertaken by the regional seas programmes and action plans, and by regional fisheries organizations and conventions, such as, *inter alia*, the South East Asian Fisheries Development Center (SEAFDEC), Westerns and Central Pacific Fisheries Convention (WCPFC), the Indian Ocean Tuna Commission (IOTC), and the Commission for the Conservation of Southern Blue Fin Tuna (CCSRT).

^{3/} Rome, Food and Agriculture Organization of the United Nations, 1999.

^{4/} Ibid., 2001.

*Annex I***DRAFT GLOBAL OUTCOME-ORIENTED 2010 TARGETS FOR THE PROGRAMME OF WORK ON MARINE AND COASTAL BIOLOGICAL DIVERSITY**

In accordance with decision VI/9, the targets presented here should be viewed as a flexible framework within which national and/or regional targets may be developed, according to national priorities and capacities, and taking into account differences in diversity between countries. Parties and Governments are invited to develop national and/or regional targets, and, as appropriate, to incorporate them into relevant plans, programmes and initiatives, including national biodiversity strategies and action plans.

Actions to reach these targets should be undertaken in the context of the ecosystem approach, which is the primary framework for the implementation of the Convention. The importance of the ecosystem approach in ensuring the long-term productivity and sustainability of marine and coastal living resources and environments, as well as contributing to sustainable development and poverty alleviation, has also been highlighted by the World Summit on Sustainable Development. Of particular importance to the targets presented here is paragraph 29 (d) of the Plan of Implementation of the World Summit on Sustainable Development, which encouraged the application by 2010 of the ecosystem approach, noting the Reykjavik Declaration on Responsible Fisheries in the Marine Ecosystem and decision V/6 of the Conference of Parties to the Convention on Biological Diversity.

The effective implementation of actions to reach these targets will require capacity-building and financial resources for developing country Parties, in particular the least developed and small island developing States among them. Therefore, Parties, other Governments, the financial mechanism, and funding organizations are invited to provide adequate and timely support towards work aimed at achieving these targets. In addition, there is a need for cooperation within and between regions and countries, for the provision of livelihood options for coastal communities that depend largely on fisheries resources, and for ensuring the fair and equitable sharing of benefits arising from the use of marine and coastal genetic resources.

*Protect the components of biodiversity***Goal 1. Promote the conservation of the biological diversity of ecosystems, habitats and biomes**

Overall target 1.1: At least 10% of each of the world's ecological regions effectively conserved

Application to marine and coastal ecosystems: This target can be directly applied to marine and coastal ecosystems

Technical rationale

According to paragraph 6 of decision VII/5, marine and coastal protected areas are one of the essential tools and approaches in the conservation and sustainable use of marine and coastal biodiversity. However, current data indicates that less than 0.5 per cent of the world's oceans are protected. The World Summit on Sustainable Development, in paragraph 32 (c) of its Plan of Implementation, adopted a target of developing a representative network of marine and coastal protected areas by 2012. Subsequently, this target was also adopted in paragraph 19 of decision VII/5 and paragraph 18 of decision VII/28. The present target and target 1.2 should be viewed in the context of this 2012 target.

The purpose of the present target is to: (i) increase the area of marine environment included in marine and coastal protected areas; (ii) increase the representation of different ecosystems in marine and coastal protected areas, including ecosystems under-represented to date, such as those in areas outside of national jurisdiction, where such areas should be established consistent with international law, and based on scientific information; and (iii) increase the effectiveness of marine and coastal protected areas. Effective conservation in this context refers to either: (i) marine and coastal protected areas where threats

are managed for the purposes of biodiversity conservation and/or sustainable use and where extractive uses may be allowed; or (ii) representative areas where extractive uses are excluded and other human pressures minimized (see decision VII/5, para. 21). In order to be truly effective, and in accordance with decision VII/5 paragraph 21, marine and coastal protected areas should be embedded in a framework of sustainable management practices and actions to protect biodiversity over the wider marine and coastal environment. Such well-functioning integrated marine and coastal area management regimes also significantly contribute to the conservation goals of this target.

Ecological regions (ecoregions) have been defined by the World Wide Fund For Nature (WWF) as “relatively large units of land or water containing a distinct assemblage of natural communities and species, with boundaries that approximate the original extent of natural communities prior to major land-use change”. Others have defined ecoregions as areas of ecological potential based on combinations of biophysical parameters such as climate and topography. The WWF Global 200 ecoregions provides a classification of 42 purely marine ecoregions. A number of the terrestrial ecoregions, such as the 8 mangrove ecoregions, can be classified as coastal. However, pelagic (trades and westerlies), abyssal, and hadal major habitat types were not assessed for the Global 200 marine analysis because of the scale of these units compared to other Global 200 ecoregions, the lack of an accepted classification, and the limited biodiversity information for these ecosystems. Large biogeographic units have been identified for pelagic and abyssal biotas, ^{5/} but their scale is several orders of magnitude greater than most Global 200 ecoregions. These larger units may be biogeographically and dynamically logical for open ocean environments. In addition, many countries have developed their own ecoregional classification systems, which have a finer scale than the WWF 200 classification system. Therefore, the ecological regions under this target, for global and regional purposes, could be assessed using a combination of the Global 200 ecoregions and appropriate larger biogeographic units for pelagic and abyssal ocean areas. If a country wishes to conduct a national assessment, it may choose to use its own ecoregional classification system. A finer scale analysis would require (i) a globally accepted classification system of marine and coastal ecosystems; (ii) increased knowledge about the distribution of most of these ecosystems; and (iii) assessment of the total area covered by these ecosystems.

The target is consistent with decision VII/28 on protected areas and with the recommendations of the World Parks Congress, both of which state that there is an urgent need for action to address the severe under-representation of marine ecosystems in the global protected areas system. Recommendation 5.22 of the 2003 World Parks Congress, as well as recent research findings, ^{6/} indicate that approximately 20-30 per cent of each marine habitat type should be protected in order to achieve sustainable use of living resources. The 20-30 per cent figure could be viewed as a longer-term goal, which should be adjusted as required in the context of adaptive management. The 10 per cent figure cited here is lower than the optimum 20-30 per cent quoted in most references, and should therefore be viewed as an intermediate, policy-relevant, target, while the needs for long term protection would be determined taken into account the status and unique characteristics of each ecological region. The 10 per cent target

^{5/} For example, Longhurst, A. 1998. Ecological geography of the sea. Academic Press, London. It should be noted that the Longhurst classification is currently used for marine areas by the Millennium Ecosystem Assessment.

^{6/} For example, Roberts, C.M., B.S. Halpern, Rr. Warner, and S. Palumbia (2002) Designing marine reserve networks: why small, isolated protected areas are not enough. Conservation Biology in Practice 2: 9-17; J.A. Bohnsack, B. Causey, M.P. Crosby, R.B. Griffis, M.A. Hixon, T.F. Hourigan, K.H. Koltes, J.E. Maragos, A. Simons and J.T. Tilmant (2000) A rationale for minimum 20-30% no-take protection. Proceedings of the 9th International Coral Reef Symposium, Bali, Indonesia, 2000; Botsford, L.W. and S.D. Gaines (2001) Dependence of sustainability on configuration of marine reserves and larval dispersal distance. Ecology Letters. 4: 144-150; Mangle, M. (2000) On the fraction of habitat allocated to marine reserves. Ecology Letters 3(1): 15-22.; Lindholm, J.P., P.J. Auster, M. Ruth, and L. Kaufman (2000) Modeling the effects of fishing and implications for the design of marine protected areas: Juvenile fish responses to variations in seafloor habitat. Conservation Biology 15: 424-437; Bohnsack, J.A. (2000) A comparison of the short term impacts of no-take marine reserves and minimum size limits. Bulletin of Marine Science 66: 615-650.

adopted by the seventh meeting of the Conference of the Parties in decision VII/30 was originally conceived for 2-dimensional terrestrial systems. In the marine environment, this target could be interpreted in a 3-dimensional context. However, at the present time, it can only be measured 2-dimensionally.

This target aims at implementing the precautionary approach through protecting representative examples of ecosystem types of which relatively little is currently known. In this context, management action should not be delayed in the hope of acquiring perfect knowledge and scientific understanding. On the contrary, better use of existing knowledge can be made in the design process, and management approaches adjusted in light of monitoring and research efforts that are oriented towards providing the necessary feedback for management. The target also implies greatly increasing the protection provided for ecosystems that have so far been under-represented in marine and coastal protected areas globally. For areas outside of national jurisdiction, the World Parks Congress in recommendation 5.23 put forward a target figure of five high-seas marine protected areas by the year 2008. Such marine protected areas should be scientifically significant and globally representative, and, in accordance with decisions VII/5 and VII/28, be established consistent with international law and based on scientific information. Adequate monitoring and enforcement should also be implemented. The Fifth Meeting of the United Nations Open-ended Informal Consultative Process on Oceans and Law of the Sea, in addressing the issue of marine protected areas beyond national jurisdiction welcomed decision VII/28, and suggested that the Ad Hoc Open-ended Working Group on Protected Areas explore options for cooperation for establishment of marine protected areas beyond national jurisdiction, consistent with international law, including the United Nations Convention on the Law of the Sea (UNCLOS), and on the basis of the best available scientific information. The Consultative Process also encouraged the participation of oceans experts in the Working Group.

This target should be implemented in a broader context of the ecosystem approach, by which effective integrated marine and coastal area management (IMCAM), or equivalent approaches, should be applied to the entire marine and coastal environment. The development of ocean policies can provide a framework for sustainable management for both countries and regions. On a larger scale, strengthening regional systems that maintain the structure and functioning of marine and coastal ecosystems can be undertaken in the context of various Regional Seas conventions and programmes, and coordinated with relevant global conventions like the Ramsar and World Heritage conventions.

Activities to reach this target should be implemented together with those associated with goals 4, 5, 7 and 8, which emphasize the need for a sustainable management framework for all human activities. Communication, education and outreach activities are also important to the success of this target.

Overall target 1.2: Areas of particular importance to biodiversity protected

Application to marine and coastal ecosystems: Particularly vulnerable marine and coastal ecosystems effectively protected, including at least [30%] of known tropical coral reefs, mangroves, estuaries and seamounts; and [70%] of cold water coral reefs, breeding areas, spawning aggregations and nursery areas.

Technical rationale

The Conference of the Parties has consistently emphasized the importance of coral reefs and their vulnerability, as is evident in the language of decisions VII/5, VI/3, V/3 and IV/5. In keeping with these decisions, this target aims to provide increased protection for vulnerable ecosystems, such as coral reefs, mangroves, estuaries, seamounts, breeding areas, spawning aggregations and nursery areas. Although the target specifies these particular ecosystems and areas, it also recognizes that there are many other vulnerable marine and coastal ecosystems, and that action to protect them should also be taken in the context of this target.

This target reflects recent data from the Global Coral Reef Monitoring Network (GCRMN) and Coral Reef Degradation in the Indian Ocean (CORDIO) project, which concluded that reefs that are highly protected and are not stressed were better able to recover from bleaching events. The 30 per cent target is based on recent research findings. ^{7/}

Many, if not most, of the estimated 100,000 or more oceanic seamounts may be unique islands of deep-sea biodiversity. In particular, the upper slopes and peaks of seamounts are home to newly discovered species that appear to exist nowhere else. In just one expedition to the Tasman and Coral Seas in the South Pacific, for example, scientists reported that 16-36 per cent of the 921 species of fish and other benthic macrofauna collected on 24 seamounts were new to science. Destructive fishing activities in these areas could bring about extinctions of entire groups of organisms that are still undiscovered. Damage from bottom trawling is also reported to be the main threat to cold water coral reefs, resulting in mechanical damage which breaks up the reef structure. According to a recent report by UNEP-WCMC, ^{8/} cold-water corals grow slowly at only a tenth of the growth rate of warm-water tropical corals, and build beautiful but fragile 3-dimensional lace work structures, which are particularly vulnerable to impacts such as damage from heavy deep-sea fishing gear. Some reefs in the East Atlantic have already been destroyed, and most others show scars from trawling. Because of their extreme vulnerability, a higher target is proposed for cold water coral reefs, with a long-term goal of protecting all cold water coral reef and seamounts.

The immediate and urgent need to manage risks to marine biodiversity of seamounts and cold water coral reefs, through, e.g. elimination of destructive fishing practices, has been highlighted by the seventh meeting of the Conference of the Parties, and by a number of other international forums, including the Fourth and Fifth Meetings of the United Nations Open-ended Informal Consultative Process on Oceans and the Law of the Sea, third informal consultation of States Parties to the Agreement on Straddling Fish Stocks and Highly Migratory Fish Stocks, as well as the World Parks Congress (recommendation 5.2.3 and the Congress document on emerging issues (UNEP/CBD/SBSTTA/9/INF/21/Add.4)), the 2003 Defying Ocean's End Conference, the Tenth Deep-Sea Biology Symposium, and the Second International Symposium on Deep Sea Corals. In addition, the International Coral Reef Initiative has now included cold water coral reefs into its agenda.

Effective protection in regards to seamounts and cold water coral reefs can be achieved through the prohibition of certain activities detrimental for their biodiversity, such as bottom trawling, and through application of tools, such as marine protected areas. These actions also contribute to the effective protection of tropical coral reefs. In its decision VII/5, the Conference of the Parties called upon the United Nations General Assembly and other relevant international and regional organizations "...to urgently take the necessary short-term, medium-term and long-term measures to eliminate/avoid destructive practices", including "interim prohibition" of destructive practices in areas with seamounts, hydrothermal vents, cold water corals and other vulnerable ecosystems. In addition, the Fifth Meeting of the Informal Consultative Process on Oceans and Law of the Sea (ICP) proposed that the General Assembly urge States, either directly or through competent regional fisheries management organizations (RFMOs), to take similar action. Implementation of the decision of the Conference of the Parties and ICP recommendation would provide a framework for necessary activities aimed at reaching this target (decision VII/5, paragraph 61 and fifth ICP recommendation 6 (a)). In addition, the implementation of

^{7/} E.g. Hughes, T.P., Baird, A.H., Bellwood, D.R., Card, M., Connolly, S.R., Folke, C., Grosberg, R., Hoegh-Guldberg, O., Jackson, J.B.C., Kleypas, J., Lough, J.M., Marshall, P., Nyström, M., Palumbi, S.R., Pandolfi, J.M., Rosen, B. and J. Roughgarden (2003) Climate Change, Human Impacts, and the Resilience of Coral Reefs. *Science*, vol. 301: 929-933

^{8/} UNEP-WCMC (2004) Cold-water Coral Reefs: Out of Sight - No Longer Out of Mind. UNEP-WCMC publication.

effective monitoring and enforcement regimes are vital for ensuring the effective application of this target.

The target also aims to increase protection of breeding, nursery and spawning areas by implementing time/area closures and other effective protection measures for these areas, including elimination of destructive fishing practices and gear. This acknowledges that the protection of breeding, nursery and spawning grounds is a critical step in the creation of sustainable fisheries and in the development of an ecologically functional marine protected areas network (and links it with overall target 4.1). The protection of nursery areas is also essential for threatened species and for wide-ranging migratory species where national and regional systems may be necessary, linking this target with target 2.2. Such activities should be undertaken in the context of the ecosystem approach. Protection of nursery and spawning areas has been identified as a priority activity in decision IV/5 of the Conference of the Parties, and in paragraph 32 (c) of the Plan of Implementation of the World Summit.

Estuaries and mangroves are highly productive, dynamic, and ecologically critical marine systems, which are important for nutrient cycling and fluxes, primary and secondary productivity, pollution control, hydrological balance, nursery areas for marine organisms, and critical habitats for many birds and mammals. In addition, mangroves play a key role in stabilizing land, cycling nutrients and provide fuelwood, timber, and fisheries resources. They also buffer land from storms, providing safe havens for humans. Estuarine systems are threatened by a variety of human impacts, which have eliminated these ecosystems in many areas, while degrading them highly in others. This has led to substantial loss of estuaries and associated wetlands globally.^{9/} Main threats include the loss or destruction of large areas of an estuary's watershed, eutrophication, non-nutrient pollutants, overfishing, invasions of alien species, and habitat conversion within the estuary itself. Many mangrove areas have become degraded worldwide, and habitat conversion of mangrove is widespread. Mangroves are converted to sites for aquaculture and for agriculture and affected by removal of trees for fuelwood and construction material, changes to hydrology in either catchment basins or nearshore coastal areas, excessive pollution, and rising sea levels. As a result, approximately 35 per cent of mangrove forests have been lost during the last two decades at the rate of 2.1 per cent per year.^{10/} Integrated management of watersheds, land-use planning and impact assessment are key to protecting these coastal ecosystems. Management conducted in an ecosystem context will be most effective in addressing loss and degradation of coastal areas, and would include identification of key threats and implementation of management that is integrated across all sectors. It would involve coordinated pollution controls, development restrictions, fisheries management and scientific research. The protection of coastal habitat must figure prominently in ecosystem-based fisheries-management.^{11/}

^{9/} Levin, L.A., Boesch, D.f., Covich, A., Dahm, C., Erseus, C., Ewell, K.C., Kneib, R.T., Moldenke, A., Palmer, M.A., Snelgrove, P., Strayer, D. and J.M. Weslawski (2001) The function of marine critical transition zones and the importance of sediment biodiversity. *Ecosystems* 4:430-451.

^{10/} Valiela I., Bowen J.L. and J.K. York(2001) Mangrove Forests: One of the World's Threatened Major Tropical Environments. *BioScience*, 1 October 2001, vol. 51, no. 10, pp. 807-815(9). American Institute of Biological Sciences

^{11/} Pauly, D., Christensen, V., Guenette, S., Pitcher, T.J., Sumaila, U.R., Walters, C.J., Watson, R. and D. Zeller (2002) Towards sustainability in world fisheries. *Nature* 418:689-695.

Goal 2. Promote the conservation of species diversity

Overall target 2.1: Restore, maintain, or reduce the decline of populations of species of selected taxonomic groups

Application to marine and coastal ecosystems: [70%] of global fisheries restored to sustainable levels

Technical rationale

The target put forward in paragraph 31 (a) of the Plan of Implementation of the World Summit on Sustainable Development calls for maintenance or restoration of fisheries stocks to levels that can produce the maximum sustainable yield with the aim of achieving these goals for depleted stocks on an urgent basis and where possible not later than 2015. This target has also been included in the elaborated programme of work on marine and coastal biological diversity as activity (h) under operational objective 2.1 (decision VII/5 annex I). If this target is to be reached by 2015, substantial progress towards it would need to be achieved by the year 2010. The elaborated programme of work puts forward a number of activities, including the implementation of the FAO Code of Conduct on Responsible Fisheries, application of the ecosystem and precautionary approaches and development of marine and coastal protected areas, which can be undertaken as measures towards achieving the target. The Plan of Implementation of the World Summit on Sustainable Development also states that there is a need to apply a variety of measures. Paragraph 32 (c) calls on countries to develop and facilitate the use of diverse approaches and tools, including the ecosystem approach, the elimination of destructive fishing practices, the establishment of marine protected areas consistent with international law and based on scientific information, including representative networks by 2012 and time/area closures for the protection of nursery grounds and periods, proper coastal land use; and watershed planning and the integration of marine and coastal areas management into key sectors. Each of these tools and approaches together with appropriate reduction in the level of fish catches and the application of precautionary approach, can also contribute towards this target, though none of them alone may be enough to reach it. In addition, appropriate economic incentives (reduction of subsidies) should be applied, and any new fisheries should be appropriately assessed for sustainable fishing levels. Paragraph 31 (d) of the WWSD Plan of Implementation also calls for countries to urgently develop and implement national and, where appropriate, regional plans of action, to put into effect the FAO international plans of action, in particular the international plan of action for the management of fishing capacity by 2005 and the international plan of action to prevent, deter and eliminate illegal, unreported and unregulated fishing by 2004. The same paragraph calls for establishment of effective monitoring, reporting and enforcement, and control of fishing vessels, including by flag States, to further the international plan of action to prevent, deter and eliminate illegal, unreported and unregulated fishing.

This target is related to target 4.1, which addresses sustainable fisheries and mariculture.

Overall target 2.2: Status of threatened species improved

Application to marine and coastal ecosystems: Effective programmes to conserve in situ, [90%] of the known globally threatened and endangered marine species established and implemented, including migratory and transboundary species.

Technical rationale

Reaching the overall target of significant reduction of the current rate of marine and coastal biological diversity loss by the year 2010 will require the effective maintenance and recovery of threatened species, including those listed in the IUCN Red List of Threatened Species (currently 737

marine species), in networks of protected areas or through other appropriate and effective management measures over the wider seascape. It will also require increased and urgent efforts to identify marine species whose life history or habitat requirements make them vulnerable to extinction and to add them to the lists of globally threatened and endangered species, where necessary, as well as to intensify efforts to prevent such vulnerable species from becoming globally threatened or endangered. It should be noted that as awareness of threatened and endangered marine and coastal species increases, it is likely that more of them will become listed, and current efforts, such as the Census of Marine Life, will likely increase our knowledge of existing marine species, as well as of their vulnerability. Because of this, the target refers to all *known* species. In this context, explicit management for uncertainty in our knowledge base is also essential. Methods to estimate the degree of threat to which yet unknown species are exposed should be employed where possible.

Activities undertaken to reach this target should be coupled with efforts to identify, by 2010, species that are globally endangered and threatened. The conservation of such not yet identified species is best undertaken through the use of precautionary tools, such as networks of highly protected MCPAs (see targets under goal 1). Specific activities to reach this target include the use of effective MCPAs covering a representative selection of habitats within each biogeographical region, and linking those MCPAs through effective ecological corridors. Conservation measures should fully take into account species' life cycles and life history. Furthermore, the distribution of some species, as well as the habitats utilized by them, may change as a result of climate change, increasing the need to have MCPAs that are large and distributed. Activities should be coordinated with relevant international agreements like CITES, CMS and protocols on protected species/areas under the Regional Seas Conventions/Programmes.

This target has been adapted from the 2003 World Parks Congress recommendation 5.04, which calls for all threatened species to be included in protected areas by the year 2012. If this recommendation is to be achieved, measures (whether through protected areas or other management action) to protect 80-90 per cent of known threatened and endangered species should be in place by the year 2010. In the longer term, measures should be undertaken to conserve, *in situ*, 100 per cent of all known threatened and endangered species. Activities to reach this target should be implemented together with those associated with goals 1, 4, 5, 7, and 8, in order to emphasize the need to undertake species management in an ecosystem context

Goal 3. Promote the conservation of genetic diversity

Overall target 3.1: Genetic diversity of crops, livestock, and of harvested species of trees, fish and wildlife and other valuable species conserved, and associated indigenous and local knowledge maintained

Application to marine and coastal ecosystems: Further significant losses of known genetic diversity of exploited wild fish and other valuable marine and coastal species prevented.

Technical rationale

Genetic diversity is lost through reduction of population size caused by, for example, direct exploitation (as is the case in species targeted by unsustainable fisheries), habitat alteration and destruction, toxic materials, and invasive species. The loss of genetic diversity in the seas and coastal areas is not well documented, but is thought to be substantial because historical over-fishing has caused

massive reduction in the abundance of large consumer species. ^{12/} Small populations contain less genetic variation than large ones, reducing their adaptability, for example, to climate change, and their ability to recover from over-exploitation, as is thought to be the case with the northern right whale. Furthermore, because most fisheries are selective in targeting the largest and oldest individuals, intensive fishing can reduce the age and size at which fish mature, leading to genetic change. For example, a recent study on northern Atlantic cod provides evidence that genetic change, caused by heavy fishing pressure, which selected against genotypes that predispose cod to mature later and larger, preceded the collapse of the stock. ^{13/}

This target aims to conserve genetic diversity among and within populations in order to increase the capability of populations and individual species to adapt to rapid environmental change. Because genetic diversity of marine and coastal species is poorly known, the target itself focuses only on exploited fish and other valuable species with known genetic diversity, such as, for example, salmon and sea turtles. However, losses of unknown genetic diversity are likely common, and therefore this target should be interpreted in the precautionary context. For example, relatively unknown ecosystems, such as hydrothermal vent communities and seamounts, may contain genetic diversity that is both unique and has potentially important economic applications, linking this target to target 1.2. Activities to reach this target (including the maintenance of general habitat character, removal of severe selective pressures and prevention of escapes of alien species) should be implemented together with those associated with goals 1, 2, 4, 5, 7, and 8, particularly as loss of unrecorded and unknown genetic diversity is likely to occur simultaneously to that known to occur with exploited species.

Promote sustainable use

Goal 4. Promote sustainable use and consumption

Overall target 4.1: Biodiversity-based products derived from sources that are sustainably managed, and production areas managed consistent with conservation of biodiversity

Overall target 4.2: Unsustainable consumption, of biological resources, or that impacts upon biodiversity, reduced

Combined application to marine and coastal ecosystems: A minimum of [70 %] of all exploited marine products derived from sources that are sustainably managed and [90%] of mariculture facilities operated consistent with the conservation of biodiversity.

Technical rationale

According to recent statistics of the Food and Agriculture Organization of the United Nations, 47 per cent of global fisheries are fully fished, while 18 per cent are overfished and 9 per cent depleted. In addition, 90 per cent of large predatory fish biomass worldwide has been lost since pre-industrial

^{12/} Jackson, J.B.C., Kirby, M.X., Berger, W.H., Bjorndal, K.A., Botsford, L.W., Bourque, B.J., Bradbury, R.H., Cooke, R., Erlandson, J., Estes, J.A., Hughes, T.P., Kidwell, S., Lange, C.B., Lenihan, H.S., Pandolfi, J.M., Peterson, C.H., Steneck, R.S., Tegner, M.J. and R.R. Warner (2001) Historical overfishing and the recent collapse of coastal ecosystems. *Science*, Vol 293, pp. 629-638.

^{13/} Olsen, E.M., Heino, M., Lilly, G.R., Morgan, M.J., Brattey, J., Ernande, B. and U. Dieckmann (2004) Maturation trends indicative of rapid evolution preceded the collapse of the northern cod. *Nature*, Vol 428: 932-935.

times ^{14/} and the mean trophic level of fisheries landings globally have declined at a rate of approximately 0.1 per decade. ^{15/} Overfishing affects habitats, food webs and non-target species, yet the impacts on biodiversity on the level of ecosystems, species and genes are poorly researched.

The rising demand for seafood has resulted in the targeting of deep oceans for new species through practices that are often destructive to biodiversity. In addition, by-catch of many seabirds, turtles and marine mammals presents a serious threat. High impact fishing (including bottom trawling, long lining, gill netting, and dynamite fishing) causes damage to the biodiversity of sensitive deep sea habitats, such as tropical and cold-water coral reefs and seamounts, and other ecosystems. Damage from bottom trawling is reported to be the main threat to cold water coral reefs. Mechanical damage kills coral and breaks up the reef structure, resulting in removal of habitat for marine life and an alteration of water and sediment processes.

By-catch amounts to approximately 30 million tonnes of sea life each year, and it is estimated that about 25 per cent of catches worldwide are discarded. By-catch of albatross and other marine mammals threatens some species with extinction, while sharks, particularly blue sharks, are threatened by the unsustainable practice of shark-finning. A number of techniques for prevention of by-catch have been developed, and activities undertaken to reach this target would include the wide application of such techniques and practices.

This target as it relates to fisheries should be viewed as a step towards achieving the target put forward in paragraph 31 (a) of the Plan of Implementation of the World Summit on Sustainable Development. The target of the World Summit on Sustainable Development aims to achieve maintenance and restoration of fish stocks to levels that can produce maximum sustainable yield, and in particular in relation to depleted stocks this should be done on an urgent basis and where possible no later than 2015. This would imply that 70 – 80 per cent sustainability would need to be reached by 2010, if the 2015 target is to be achieved. The long term goal, in accordance with the WSSD Plan of Implementation, is for all fishery products to be derived from sustainable sources, and for all mariculture facilities to operate consistent with conservation of biodiversity.

Sustainability in this context can be defined through the Code of Conduct for Responsible Fisheries of the Food and Agriculture Organization of the United Nations. Article 7 of the Code of Conduct for Responsible Fisheries sets out fisheries management principles for long-term conservation and sustainable use of fisheries resources. Based on the Code of Conduct, the Marine Stewardship Council (<http://www.msc.org/>) has put forward principles and criteria for sustainable fisheries. The principles and criteria reflect the recognition that a sustainable fishery is based on (i) the maintenance and re-establishment of healthy populations of targeted species; (ii) the maintenance of the integrity of ecosystems; (iii) the development and maintenance of effective fisheries management systems, taking into account all relevant biological, technological, economic, social, environmental and commercial aspects; and (iv) compliance with relevant local and national laws and standards and international understandings and agreements. The Agreement for the Implementation of the Provisions of the United Nations Convention on Law of the Sea of 10 December 1982 Relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks (United Nations Fish Stocks Agreement) contains principles related to sustainable, ecosystem-based fisheries management, but it needs to be more widely ratified and implemented. It should also be applied to all high seas fish stocks, not just those that

^{14/} Myers, R.A. and B. Worm (2003) Rapid Worldwide Depletion of Predatory Fish Communities. *Nature*, vol 423: 280-283.

^{15/} Pauly, D, Christensen, V., Dalsgaard, J., Froese, R., and F. Torres (1998) Fishing Down Marine Food Webs. *Science*, vol 279: 860-863.

are highly migratory or straddling. Paragraph 31 (b-f) of the Plan of Implementation of the World Summit also puts forward a number of actions that will contribute to the achievement of this target.

It should be noted that parts of the industry are already moving in this direction. For example, Unilever, the world's leading supplier of fast moving consumer foods, has committed itself to buy fish only from sustainable stocks by 2005. In addition, many traditional, indigenous and local communities have for generations employed environmentally sustainable and selective fishery practices.

This target is related to the targets under goal 1, as marine and coastal protected areas present a key tool for achieving sustainable fisheries. It is also related to target 2.1 on reducing the decline of fish stocks. However, as indicated under the rationale for target 8.1, achieving sustainable fisheries and eliminating destructive impacts will require broader efforts to develop and implement a sustainable fisheries management framework in an ecosystem context that incorporates the protection of marine biodiversity.

Regarding the target as it relates to mariculture, the Ad Hoc Technical Expert Group on Mariculture stated that all forms of mariculture affect biodiversity at the genetic, species and ecosystem level. The main effects include habitat degradation, disruption of trophic systems, depletion of natural seedstock, transmission of diseases, and reduction of genetic variability. In addition, the need to feed cultured carnivorous marine fish wild caught protein leads to net loss of biodiversity, unless alternative (soy-based) feed sources are used. This practice may also affect food security of coastal communities in places where small pelagic fisheries are being diverted to the fishmeal sectors, which provide a higher price than what could be obtained locally. ^{16/} The biodiversity effects of pollutants, such as chemicals and drugs, are not very well studied, though are generally assumed to be negative. While mariculture output is still dwarfed by the tonnage of farmed freshwater organisms, it is growing worldwide, and has become an important contributor to the world's food supply. No internationally agreed criteria have yet been developed specifically for the environmental regulation of aquaculture operations, but many national and regional regulations and laws, largely based on scientifically accepted environmental criteria, have been adopted. Article 9 of the Code of Conduct for Responsible Fisheries of the Food and Agriculture Organization provides a set of voluntary principles and standards that, if applied, ensure that potential social and environmental problems associated with aquaculture development are duly addressed and that aquaculture develops in a sustainable manner. This target therefore acknowledges the contribution of mariculture to food security while seeking to ensure that mariculture operations are undertaken in a sustainable manner.

Overall Target 4.3: No species of wild flora and fauna endangered by international trade

Application to marine and coastal ecosystems: This target can be directly applied to marine and coastal ecosystems

Technical rationale

Global surveys indicate that international trade in marine species, particularly corals and coral reef species, continues to increase. Trade in marine species includes food trade (for example fish and lobsters), ornamental trade (for example aquarium fish, corals and other invertebrates), and curio trade

^{16/} Tyedmers, P. (2004) Fisheries and energy use, Cleveland, C. (ed.) Encyclopedia of Energy. Academic Press/Elsevier Science. Vol.2

(for example shells, such as triton). It is estimated that the value of the marine ornamental trade is approximately US\$200-330 million per year, with 80 per cent of the trade in stony corals and 50 per cent of the trade in marine fish going to the United States, with the rest going mainly to the European Union (EU), and, to a lesser extent, Japan. ^{17/} Ornamental marine species are collected and transported mainly from Southeast Asia, but also increasingly from several island nations in the Indian and Pacific Oceans. Unsustainable marine ornamental species trade may have a number of biodiversity effects resulting from destructive collection practices, the introduction of alien species, over-harvesting and the lack of scientific information for many species collected, and the threat of extinction of target species. Destructive harvesting practices include the use of sodium cyanide and other chemicals. Although illegal in most countries, cyanide is often used to capture reef fish for the live food fish and aquarium trades, and its use continues to spread geographically. Use of cyanide is associated with the physical degradation and destruction of the portion of the reef where the fishes being caught are hiding. Collection of coral pieces may cause many more colonies to be damaged and broken than are actually harvested. Introduction of aquarium fish species to areas where they do not occur naturally may cause them to become invasive, as is the case with the introduction of lionfish (*Pterois volitans*), a native to the Indo-Pacific Region, to the East Coast of the United States. In addition, severe human health impacts, from unsafe diving practices, occur in collectors for the live reef fish and aquarium trade. However, aquarium trade undertaken in a sustainable manner can bring benefits to local communities in predominately rural, low-income coastal areas. In addition, because the aquarium industry as a whole is relatively low volume yet very high value, it can potentially provide an incentive to conserve reef habitats. ^{18/}

Sustainable ornamental fisheries would be managed in such a way that they are biologically sustainable (harvested species are replenished in their natural habitat at the same or greater rate than they are collected), do not conflict with other resource users and keep post-harvest mortalities to a minimum. In addition, habitat damage and impacts to other species are minimized, species unsuitable for aquaria are not collected, and trade is conducted in an equitable manner. ^{19/} The use of certification schemes for the marine aquaria trade can be an important tool to reach this target as it relates to ornamentals. The Marine Aquarium Council (MAC) is an international, third-party certification system, which provides the means to verify that industry operators employ responsible, environmentally sound practices, and that the collected marine organisms are healthy. A certification system can also ensure the provision of sustainable livelihoods in coastal villages with limited natural resources. The improvement and further development of mariculture of marine ornamentals may also reduce the pressure on coral reef ecosystems.

On a broader scale, the Convention on International Trade of Endangered Species of Fauna and Flora (CITES) is an important international mechanism for regulating trade. CITES is also a way for importing countries, which are often creating the demand for products, to share responsibility with the source countries for ensuring that trade is sustainable. Currently species listed under CITES include 2000 species of hard (stony) corals, black coral, giant clams, queen conch, sea turtles, all dolphins, all great whales, basking shark, whale shark, seahorses, all sturgeon species, six fur seal species and all coelacanths. CITES listings have a potential role in promoting management and sustainable use of marine species and products. Therefore the protection of additional species threatened by international trade through listing or strengthened protection, based on the precautionary approach and scientific information, presents an important tool for reaching this target.

^{17/} Wabnitz, C., Taylor, M., Green, E., and T. Razak (2003) From Ocean to Aquarium. UNEP-WCMC, Cambridge, UK.

^{18/} Ibid.

^{19/} Ibid.

Goal 5. Pressures from habitat loss, land use change and degradation, and unsustainable water use, reduced

Overall Target 5.1: Rate of loss and degradation of natural habitats decreased

*Application to marine and coastal ecosystems: **Rate of loss and degradation of natural marine and coastal habitats, such as mangroves, coastal wetlands, seagrasses, coral reefs and other vulnerable seabed habitats, decreased***

Technical rationale

Habitat degradation is a major cause of biodiversity loss in the marine and coastal environment. According to *the third Global Environment Outlook (GEO-3)*, the driving force for physical alteration of habitats is ill-planned, and accelerating, social and economic development in coastal areas, which itself results from such increasing pressures as population, urbanization and industrialization, maritime transport and tourism. Estimates show that almost 50 per cent of the world's coasts are currently threatened by development-related activities. Approximately 40 per cent of the human population now live within 100 kilometres of the coast, and the density of people living in coastal areas (approximately 100 people per square kilometre) is much higher than in inland areas (approximately 38 people per square kilometre). ^{20/} In addition, most of the world's megacities and large population centres are on the coast. The increase in coastal populations and economic activities is leading to an expansion of the direct use of coastal resources and negative human-induced changes to ecosystems. Mangroves, other coastal wetlands, seagrasses and coral reefs are particularly threatened. According to the 2001 report *A Sea of Troubles*, produced by the Joint Group of Experts on the Scientific Aspects of Marine Environmental Protection (GESAMP) half of the world's wetlands and over half of the world's mangrove forests were lost during the twentieth century. The loss of mangroves leads to coastal erosion and loss of nursery areas, causing widespread detrimental effects on biodiversity. Coral reefs are threatened by a number of human impacts, such as land-based sources of pollution and sedimentation, climate change, shipping and tourism. Additionally, all vulnerable seabed habitats are threatened by destructive fishing practices, such as use of explosives and bottom trawling. The rationale for target 1.2 describes such impacts and mitigation measures in more detail.

Activities to reach this target include the implementation of effective integrated marine and coastal area management, in conjunction with watershed management, and environmentally sound coastal planning, as elaborated in the rationales for targets 1.1 and 1.2. Marine protected areas implemented in parallel with initiatives to reduce the destructive capacity of fishing gear, for example through introduction of low-impact gear designs and establishment of areas where use of destructive gear is prohibited, could be significant measures for seabed habitat protection.

Goal 6. Control threats from invasive alien species

Overall target 6.1: Pathways for major potential alien invasive species controlled.

*Application to marine and coastal ecosystems: **All major pathways for potential alien invasive species in the marine and coastal environment identified, evaluated and managed to reduce risk of invasion using best practices.***

^{20/} CIESIN, 2000 data

Technical rationale

The main sources of introductions of invasive alien species into the marine environment are considered to be ballast water from ships, fouling of ships, mariculture, intentional and unintentional release of live organisms, and migration through canals. Therefore, controlling these vectors is likely to have the greatest effect in reducing the number and severity of invasions. However, this target also recognizes that other sources of introductions exist (for example trade in marine species, and aquarium releases or escapes) and that controlling all pathways through effective regulation is important.

Significant effort has been and is being expended on addressing the ballast water vector, including the recent adoption of the International Convention on the Control and Management of Ships' Ballast Water and Sediments by IMO member States; the GEF/UNDP/IMO GloBallast Programme; significant ballast water research and development; and various national measures. The rapid entry into force and effective implementation of the ballast water Convention should be a priority activity to reach this target. Development and effective implementation of new ballast water treatment technologies to eliminate the need for open-ocean exchange will also be necessary.

Given the progress made on ballast water issues, priority at this time should be given to addressing other important marine vectors. Necessary activities would include the further development of regulations, programmes and measures to control the introduction of alien species through fouling of ships, mariculture, intentional and unintentional release, canals and other vectors. In addition, all vectors should be properly identified. Regarding mariculture, which is a source of alien species through escapes from hatcheries and mariculture operations, there is a need for national and regional approaches based on scientifically accepted environmental criteria, as indicated in the rationale under target 4.1.

The control of pathways is regarded as the most effective way to address the problem of invasive alien species in the marine environment, as eradication of an already established species is extremely difficult, if not impossible. This target is adapted from paragraph 34 (b) of Plan of Implementation of the World Summit.

Goal 7. Address challenges to biodiversity from climate change and pollution

Overall target 7.1: Maintain and enhance resilience of the components of biodiversity to adapt to climate change

Application to marine and coastal ecosystems: This target can be directly applied to marine and coastal ecosystems

Technical rationale

Ecosystems that are healthy have a significant capacity to both resist and recover from periodic disturbances, such as coral-bleaching events or population collapses due to shifts in currents and changes in sea temperature. Ecosystems in a compromised state have limited capacity to do so. In the case of coral reefs, the destruction of associated habitats, such as mangroves and seagrass beds, which serve as nursery areas for many reef species, contributes to the limited capacity of coral-reef ecosystems to recover from natural or human-induced impacts. As noted in decision V/3 of the Conference of the Parties, most coral reefs are located in developing countries, and the majority of the people living near coral reefs are often extremely poor. Thus, even minor declines in the productivity of coral-reef ecosystems as a result of coral bleaching events could have dramatic socio-economic consequences for local people who depend on coral-reef services. A similar issue applies in areas such as the Pacific coast of South America, where El Niño/La Niña cycles have major effects on the fisheries on which many poor communities and many seabirds and marine mammals depend. Other impacts on affected species such as Humboldt penguins can remove their ability to recover from these periodic climate events, particularly if human-induced climate change alters those cycles.

This target seeks to maintain ecosystem resistance and resilience to climate change through controlling and minimizing other major human-induced impacts on coastal ecosystems and species resulting from a variety of causes including overexploitation, coastal development, destructive fishing practices, land-based pollution, coral mining, marine-based pollution, and recreational misuse. It also aims to minimize the impact of climatic events, such as coral bleaching, on coastal communities dependent on marine and coastal resources for their livelihoods. Relevant activities may include identification and institution of additional and alternative measures for securing the livelihoods of people who directly depend on the services provided by the affected ecosystems. The application of sound management practices, including marine and coastal protected areas and integrated marine and coastal area management, are integral for achieving this target. Representative networks of marine and coastal protected areas should be designed to offer resilience in the face of climate-induced threats, including through maintaining connectivity between more highly protected areas and providing for replication of habitat and ecosystem types. The updated coral bleaching workplan (decision VII/5 appendix 1) provides activities that can be undertaken to reach this target. These activities should be implemented together with those related to those under goals 1, 2, 3, 4, 5, 6 and 8. It may also be appropriate to institute specific recovery programmes to assist some affected species, for example, by significantly reducing predation or by-catch of penguin populations during the recovery period.

Overall target 7.2: Reduce pollution and its impacts on biodiversity

*Application to marine and coastal ecosystems: **Substantial improvement in marine ecosystem health and coastal water quality achieved by protecting the marine environment from land-based activities.***

Technical rationale

Land-based activities are a major source of threats to the health, productivity and biodiversity of the marine environment. The term “health” in this context should be interpreted as the ability of an ecosystem or population to regenerate from damage and stress, and could be considered to be equivalent to the term “resilience”. Threats from land-based activities include pollution (municipal, industrial and agricultural wastes and run-off, as well as atmospheric deposition), nutrient enrichment (particularly increases in dissolved nitrogen and phosphorus) and physical alteration and destruction of habitats. According to a recent report by the United Nations Environment Programme, land-based sources of marine pollution have led to a substantial worldwide increase in hypoxic events and areas, highlighting the urgent need to address this issue. ^{21/} In addition, episodes of harmful algal blooms are increasing in frequency and intensity, impacting coastal resources and inhabitants. ^{22/}

The application of this target is consistent with paragraph 33 of the Plan of Implementation, and progress towards it can be achieved through effective application of the Global Programme of Action for the Protection of the Marine Environment from Land-based Activities, regional instruments, programmes and processes, and other appropriate means, such as the relevant components of UNCLOS and IMO. This activity is also listed as proposed activity (c) under operational objective 1.2 in decision VII/5 annex 1. More specifically, the World Summit on Sustainable Development in its plan of implementation lists a number of related actions, which include proper coastal land use, watershed planning, and integration of integrated marine and coastal area management into key sectors. In this context, there is a need for effective strategies for waste reduction and management in order to reduce land-based pollution and

^{21/} United Nations Environment Programme (2004) GEO Yearbook 2003.

^{22/} Epstein, P.R. and J.R. Jenkinson (1993) Harmful Algal Blooms. Lancet 342:1108.

offshore dumping, and a need for adequate port reception facilities for wastes from ships. Provisions under existing regional programmes and/or conventions (such as, *inter alia*, OSPAR, International North Sea Conferences, Trilateral Protection of the Wadden Sea, HELCOM, Barcelona Convention, Istanbul Convention, Cartagena Convention) or legislation (such as, *inter alia*, within the European Community) as well as world-wide conventions (such as the POPs Convention) provide powerful instruments to reach this target.

Recent monitoring data ^{23/} show that coral reefs that are protected from other external stress factors are better able to recover from climate-change induced coral bleaching events, linking the implementation of this target to those under goal 1. This target, which is adapted from paragraphs 33 and 32 (c) of the Plan of Implementation of the World Summit, seeks to reduce and eliminate to the extent possible land-based impacts on the marine environment, therefore also increasing the ability of marine habitats to recover from climate-change-induced impacts, such as coral bleaching.

Maintain goods and services from biodiversity to support human well-being

Goal 8. Maintain capacity of ecosystems to deliver good and services and support livelihoods

Overall target 8.1: Capacity of ecosystems to deliver goods and services maintained.

Application to marine and coastal ecosystems: This target can be directly applied to marine and coastal ecosystems

Technical rationale

Marine and coastal ecosystems deliver a range of goods and services. These include: (i) provision of protein supply through fish to 6.2 billion people globally as well as other food sources like seaweed; (ii) provision of livelihood and employment for at least 150 million people, particularly in the developing world; (iii) functionality of healthy marine ecosystems that cycle nutrients, including from land run-off into food chains that ultimately supply fish and other products for human consumption; (iv) generation of significant tourism income and support to international commerce; (v) provision of effective barriers to mitigate/protect against severe storms and erosion; and (vi) acting as the major component of global climate regulation. The recent World Parks Congress concluded that given the level of threat worldwide to marine ecosystems, there is an urgent need for action to protect and restore ocean health and productivity. This is reinforced by the growing evidence of fisheries decline and collapse, and the increasing pressures on coastal resources as a result of 40 per cent of the world's population living within 100 kilometers of the coast. Furthermore, the growing reach of technology means that the last natural refuges are becoming accessible.

Management of marine and coastal resources is always undertaken in the context of scientific uncertainty, and because of this, management action that is precautionary in nature, based on the best available science, and is applied on a broad ecosystem scale can best maintain ecosystem capacity to deliver goods and services. This target can be seen as an application of the target set forward in paragraph 30 (d) of the Plan of Implementation of the World Summit on Sustainable Development, which encourages the application of the ecosystem approach by the year 2010. The ecosystem approach is the

^{23/} Wilkinson, C. (Ed) (2002) Status of Coral Reefs of the World: 2002; Linden, O., Souter, D., Wilhelmsson, D and D. Obura (Eds) (2002) Coral Reef Degradation in the Indian Ocean – Status Report 2002.

primary framework for the implementation of the Convention, and its importance in ensuring the long-term productivity and sustainability of marine and coastal living resources and environments has been highlighted, for example, by the Reykjavik Declaration on Responsible Fisheries in the Marine Ecosystem, the World Summit on Sustainable Development, the United Nations General Assembly and the recent Fifth Meeting of the United Nations Open-Ended Informal Consultative Process on Oceans and the Law of the Sea. The ecosystem approach also takes into consideration the societal needs of communities dependent on biodiversity resources, and promotes the fair and equitable sharing of the tangible and intangible benefits of biodiversity. It recognizes that humans with their cultural diversity are an integral component of many ecosystems.

Overall target 8.2: Biological resources that support sustainable livelihoods, local food security and health care, especially for poor people maintained.

Application to marine and coastal ecosystems: This target can be directly applied to marine and coastal ecosystems

Technical rationale

According to Agenda 21, “marine living resources provide an important source of protein in many countries and their use is often of major importance to local communities and indigenous people. Such resources provide food and livelihoods to millions of people and, if sustainably utilized, offer increased potential to meet nutritional and societal needs, particularly in developing countries.” Sustainable use of such resources can directly contribute to poverty alleviation, and can be in conformity with the Millennium Development Goals (MDGs) as noted in annex I to decision VII/5 (basic principles). In this context, it should be noted that the lives of the majority of fisherfolk, particularly in developing countries, are characterized by high levels of poverty and vulnerability.

Marine and coastal biodiversity provides direct and indirect economic benefits to coastal communities. Marine and coastal resources contribute to local livelihoods through subsistence, artisanal, traditional, customary, commercial and recreational fishing; mining and construction material; harvesting for aquarium and ornamental trades; and harvesting for pharmaceutical trades. In addition, non-extractive activities, such as tourism and aquaculture, enhance the livelihoods of coastal people. It is therefore not surprising that coastal areas generally have higher per capita GNP and better life expectancy than inland areas.

Coastal systems generate a variety of seafood products, such as fish, mussels, crustaceans, sea cucumbers and seaweeds. ^{24/} Capture fisheries within coastal waters (waters down to 50m depth) account for \$34 billion in yields annually. Fisheries and fish products provide direct employment to nearly 27 million people. ^{25/} Globally, the bulk of the people employed in fisheries are poor and many are without alternative sources of work and sustenance. In addition, fish and fishing are important to the cultural life of many coastal communities. The maintenance of healthy marine and coastal ecosystems is therefore directly linked to the well-being of coastal communities. The issues of access, equity and sustainability are important for local communities, and particular attention may be required within the ecosystem

^{24/} Moberg, F. and C. Folke (1999) Ecological goods and services of coral reef ecosystems. *Ecological Economics* 39(2):271-284; and Ronnback, P. (1999) The ecological basis for economic value of seafood production supported by mangrove ecosystems. *Ecological Economics* 29(2):235-252.

^{25/} FAO 2002

approach to address the capacity of nearshore areas to produce resources for those who cannot access more remote areas.

Coral reefs, for example, are found on the coasts of the world's most heavily populated developing countries and provide food and security for millions of people. Potential net benefits from coral reefs have been estimated in the order of \$30 billion per year, if coral reefs were well-managed and intact. Potential reef fishing benefits are estimated at US\$ 5.7 billion annually, while tourism and recreation benefits are estimated to be US\$ 9.6 billion. ^{26/} Recreational fishing is a major industry in many parts of the world, and coral reef based recreational fisheries generate over \$100 million annually. Coral reefs are also a potential source of pharmaceutical products, and are already used for HIV and cancer treatments. The pharmaceutical industry has discovered potentially useful substances among the seaweeds, sponges, corals, sea cucumbers and sea anemones inhabiting coral reef ecosystems. ^{27/} In addition, coral reefs provide protection to coastal areas from ocean waves. This protective function alone has an estimated value of US\$ 9 billion. ^{28/} Other coastal and marine ecosystems, such as mangroves, also have high economic value. For example, the annual market value of seafood supported by mangroves has been calculated to range from \$750 to \$16,750 per hectare. ^{29/}

Given the substantial economic values provided by marine biodiversity, the costs involved in its conservation and sustainable use are negligible. For example, a recent study estimated that a global network of marine protected areas meeting the World parks Congress target of conserving 20-30 per cent of the world's seas might cost between \$5 billion and \$19 billion annually to run and would probably create around one million jobs. ^{30/} The costs could also be offset by likely social gains from increasing sustainability of fisheries and securing vital ecosystem services, if such measures are taken in partnership with local communities and indigenous people and contribute directly to poverty alleviation and local food security.

Other tools to reach this target include the application of integrated marine and coastal area management, including regulating the harvesting of marine resources and mariculture, and controlling physical degradation and pollution from land-based and sea-based activities.

Protect traditional knowledge, innovations and practices

Goal 9: Maintain socio-cultural diversity of indigenous and local communities

Overall target 9.1: Protect traditional knowledge, innovations and practices

Application to marine and coastal ecosystems: This target can be directly applied to marine and coastal ecosystems

^{26/} Cesar, H., Burke, L. and L. Pet-Soede (2003) The economics of worldwide coral reef degradation. WWF.

^{27/} Carte, B.K. (1996) Biomedical potential of marine natural products. *Bioscience* 46(4): 271-286; and Moberg, F. and C. Folke (1999) Ecological goods and services of coral reef ecosystems. *Ecological Economics* 39(2):271-284.

^{28/} Cesar, H., Burke, L. and L. Pet-Soede (2003) The economics of worldwide coral reef degradation. WWF.

^{29/} Ronnback, P. (1999) The ecological basis for economic value of seafood production supported by mangrove ecosystems. *Ecological Economics* 29(2):235-252.

^{30/} Balmford, A., Gravestock, P, Hockley, N., McClean, C. and C. Roberts (2004) The worldwide costs of marine protected areas. *PNAS*, Vol. 101, No. 26.

Overall target 9.2: Protect the rights of indigenous and local communities over their traditional knowledge, innovations and practices, including their rights to benefit sharing

Application to marine and coastal ecosystems: This target can be directly applied to marine and coastal ecosystems

Combined technical rationale for targets 9.1 and 9.2

Indigenous, traditional and local communities have a wealth of knowledge about biodiversity and its sustainable management, and in many countries marine and coastal biodiversity underpins livelihoods and food security. Application of sustainable local and traditional knowledge in the management of biological resources may also promote the maintenance of local and traditional knowledge systems. World-wide experience has also shown that local and indigenous communities must be empowered to ensure that their knowledge is applied in marine and coastal biodiversity management, highlighting the need for both bottom-up and top-down approaches to management. ^{31/}

This target is consistent with target 9 of the Millennium Development Goals (to integrate principles of sustainable development into country policies and programmes and to reverse the loss of environmental resources) and Agenda 21. Measures to address the decline in associated indigenous and local knowledge should be implemented consistent with the Convention's programme of work on Article 8(j) and related provisions. Fair and equitable sharing of benefits also plays a potentially important role in poverty eradication and environmental sustainability, consistent with the goals and targets of the Millennium Development Goals.

^{31/} Kelleher, G (2000) Proceedings from the International Coral Reef Symposium, Bali, Vol 2, P. 609.

*Ensure the fair and equitable sharing of benefits arising out of the use of genetic resources***Goal 10. Ensure the fair and equitable sharing of benefits arising out of the use of genetic resources**

Overall target 10.1: All transfers of genetic resources are in line with the Convention on Biological Diversity, International Treaty on Plant Genetic Resources for Food and Agriculture and other applicable agreements.

Application to marine and coastal ecosystems: **This target can be directly applied to marine and coastal ecosystems**

Overall target 10.2: Benefits arising from the commercial and other utilization of genetic resources shared with countries providing such resources

Application to marine and coastal ecosystems: **This target can be directly applied to marine and coastal ecosystems**

Combined technical rationale for targets 10.1 and 10.2

In order to assist Parties, Governments and relevant stakeholders with the implementation of the access and benefit-sharing provisions of the Convention, the Conference of the Parties adopted at its sixth meeting the Bonn Guidelines on Access to Genetic Resources and the Fair and Equitable Sharing of the Benefits arising from their Utilization. These voluntary guidelines are meant to assist Parties and relevant stakeholders when establishing legislative, administrative and policy measures on access to genetic resources and benefit-sharing and/or when negotiating contractual arrangements for access and benefit sharing. Against this background, this target aims to ensure that national systems established to implement the access and benefit-sharing provisions of the Convention, also cover access to marine and coastal genetic resources and the fair and equitable sharing of benefits arising out of the utilization of these resources, in accordance with the Convention.

It should be noted however that genetic resources in the deep seabed in areas outside of national jurisdiction are not covered by the access and benefit-sharing provisions of the Convention, and that this issue may deserve further consideration in the context of decision VII/5 and in accordance with the legal framework set up by the United Nations Convention on the Law of Sea.

Ensure provision of adequate resources**Goal 11.1: Parties have improved financial, human, scientific, technical and technological capacity to implement the Convention**

Overall target 11.1: New and additional financial resources are transferred to developing country Parties, to allow for the effective implementation of their commitments under the Convention, in accordance with Article 20.

Application to marine and coastal ecosystems: **This target can be directly applied to marine and coastal ecosystems**

Overall target 11.2: Technology is transferred to developing country Parties, to allow for the effective implementation of their commitments under the Convention, in accordance with Article 20, paragraph 4.

Application to marine and coastal ecosystems: **This target can be directly applied to marine and coastal ecosystems**

Combined technical rationale for targets 11.1 and 11.2

The lack of financial resources, capacity, and sustainable technological resources are consistently cited by Parties as the main impediments for the effective implementation of the Convention and its provisions. In addition, development of improved economic instruments and social institutions is needed. Therefore, the undertaking of activities to reach the targets listed here are dependent on the availability of such resources. It should be noted, though, that transfer of inappropriate technology has caused habitat and fish stock destruction in some developing countries, and therefore the emphasis under this target is placed on activities related to transfer of sustainable technologies.

Annex II

REVIEWERS

This document incorporated comments received from Governments at SBSTTA 9 or immediately thereafter.

In addition, this document was opened for peer review twice: in September 2003 and in August 2004. Review comments were received from the following:

Ms. Jackie Alder, Fisheries Department, University of British Columbia, Canada
Ms. Margarita Astralaga, Ramsar Convention
Mr. Salvatore Arico, UNESCO
Mr. James Bohnsack, NOAA, USA
Mr. Billy Causey, NOAA, USA
Ms. Leanne Fernandes, Great Barrier Reef Marine Park Authority, Australia
Ms. Valentina Germani, UNDOALOS
Mr. Steve Gittings, NOAA, USA
Ms. Kristina Gjerde, IUCN
Mr. Phillippe Gouletquer, IFREMER, France
Mr. Edmund Green, UNEP-WCMC
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Mr. Richard Kenchington, University of Wollagong, Australia
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Ms. Mai Britt Knoph, Ministry of the Environment, Norway
Mr. Daniel Laffoley, English Nature
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Ms. Elizabeth Moore, NOAA, USA
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